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SPRUSON & FERGUSON

AUSTRALIA

PATENTS ACT 1990

PATENT REQUEST: STANDARD PATENT

I/We, the Applicant(s) and Nominated Person(s) specified below, request I/We be granted a patent for the invention disclosed in the accompanying standard complete specification.

[70] & [71] Applicant(s) and Nominated Person(s):

Siemens Ltd., incorporated in Victoria, of 544 Church Street, Richmond, Victoria, 3121, AUSTRALIA

[54] Invention: Remote Sensing of Meter Readings

[72] Inventor(s): Robert Burrett Arnold

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ASSOCIATED PROVISIONAL APPLICATION DETAILS

[31] Application No(s)	[33] Country	[32] Application Date
[redacted]	AU	28 August 1990

DATED this TWENTY SECOND day of AUGUST 1991

Siemens Ltd.

By:

Registered Patent Attorney

OUR REF: 189899

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(12) PATENT ABSTRACT (11) Document N . AU-A-82700/91
(19) AUSTRALIAN PATENT OFFICE

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REMOTE SENSING OF METER READINGS

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(57) Claim

1. A system for remote operation of public utility loads and/or meters, said system comprising a central station, a plurality of widely dispersed user locations each of which is connected through the public telephone network to the central station, a public paging transmitter accessible via the public telephone network, a paging receiving device at each said user location and connected to control apparatus at said location for the reading of a meter and/or the operation of a switch, said control apparatus being connectable to said public telephone system at said location following receipt of a transmitted pager signal.

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AUSTRALIA

PATENTS ACT 1990

COMPLETE SPECIFICATION

FOR A STANDARD PATENT

ORIGINAL

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ASSOCIATED PROVISIONAL APPLICATION DETAILS

[31] Application No(s)	[33] Country	[32] Application Date
PK2004	AU	28 August 1990

The following statement is a full description of this invention, including the best method of performing it known to me/us:-

5815/3

The present invention relates to a system for the remote operation of public utility loads and meters and finds particular application in the remote sensing of meters of the kind used by public utilities such as gas, electricity and water supply authorities. In addition, the system allows the loads supplied by such authorities to be switched on and off.

Most public utilities provide their users with a metering device which is installed at or near the point of use. Most domestic users of gas, electricity or water supplied through a public network will be familiar with the electricity meter, the gas meter or the water meter commonly located towards the front of the property. In order to charge the users for the amount of gas, electricity or water consumed, an officer of the appropriate public utility must periodically come to each property to read the metering so that the public utility can determine the amount of gas, electricity or water consumed and debit the user accordingly.

Various prior art systems are known which avoid the need for an officer of the public utility to call at each location, however, for various reasons including excessive capital or communications costs, these prior art systems have not found commercial acceptance.

In addition, especially in relation to electricity supply authorities, there is a need to be able to switch various loads on and off. The most obvious is an off-peak water heating service, however, air conditioning units and other apparatus also fall within this category. Hitherto, such loads have been remotely switched by means such as ripple control pulses sent to the property over the power supply wires.

It is the object of the present invention to provide a combined system which enables meters to be read and/or loads to be switched on and off and thereby enhance the flexibility and productivity of the public utility.

According to a first aspect of the present invention there is disclosed a system for remote operation of public utility loads and/or meters, said system comprising a central station, a plurality of widely dispersed user locations each of which is connected through the public telephone network to the central station, a public paging transmitter accessible via the public telephone network, a paging receiving device at each said user location and connected to control apparatus at said

location for the reading f a meter and/ r the operation of a switch, said contr l apparatus being connectable to said public telephone system at said location following receipt of a transmitted pager signal.

According to a second aspect of the present invention there is disclosed control apparatus for use with the abovementioned system, said control apparatus comprising a microprocessor, a decoder connecting said microprocessor to a paging receiving device, a telephone dialler and modem connecting said microprocessor to said public telephone system, at least one switch means connected to, and operable by, said microprocessor, and an encoder connecting said meter and said microprocessor.

A preferred embodiment of the present invention will now be described with reference to the drawings in which:

Fig. 1 is a schematic plan of the overall system, and

Fig. 2 is a block diagram of the apparatus installed at each user location in the system.

As seen in Fig. 1, the overall system takes the form of a central control station 1 having a CPU 2, generally in the form of a host computer. The central control station 1 is connected by means of the public telephone network 3 to each control apparatus 4 located at the user's property. The central control station 1 is also connected via the telephone network 3 to the transmitter 5 of a public paging system of the type which is normally available in most large cities.

The control apparatus 4 located at each user's property is illustrated schematically in Fig. 2. The control apparatus has an aerial 10 and amplifier 11 for receipt of the transmissions from the transmitter 5 which, after amplification, are passed through a decoder 12 to a microprocessor 13.

The microprocessor 13 receives signals from an encoder 14 which is connected to the substantially conventional meter 15 already provided by the public supply utility. In addition, the microprocessor 13 is able to operate various switches 16 in order to turn on loads, or turn off loads.

Finally, the microprocessor 13 is connected to the public telephone network 3 by means of a modem 17 and a telephone dialler 18.

The operation of the above described arrangement is as follows. If the central contr l station 1 wishes to turn on a specific off-peak load, a signal is sent from the control station 1 to the transmitter 5 and

transmitted over the public pager network. Only the decoder 12 of the intended control apparatus 4 responds to the coded signal transmitted over the pager network. Accordingly, the corresponding microprocessor 13 is activated and receives a message instructing it to operate switch 1 of the switches 16, for example.

Alternatively, if it is intended to read the meter 15, then the control apparatus 4 of the corresponding location is again paged, the corresponding microprocessor 13 activated, the meter 15 read via encoder 14, and the results stored in the microprocessor 13. Then the microprocessor 13 activates the telephone dialler 18 so as to connect the particular control apparatus 4 to the central control station 1. Following successful completion of the telephone connection, the data is passed from the microprocessor 13 through the modem 17 to the CPU 2 at the central control station 1. With the telephone line 2 still connected, central control station 1 is able to switch any of the loads, if desired. Then the telephone connection is broken by way of time out (determined by the CPU 2) or a request to disconnect.

It will be apparent to those skilled in the art that the above described system enables remote meter reading, and also enables remote switching on and off of loads. Therefore the system combines the roles of the visiting meter reader, and the ripple control system.

However, in addition, the system is accessible to the consumer via the public telephone paging network. Therefore, it is also possible for a consumer to himself control his corresponding control apparatus 4. Thus, for example, two hours before leaving his office of an afternoon, a user can send a public paging signal to his home and switch on the control apparatus 4 at his home in order to turn on a domestic heating system. In this way, the home is warm when the user arrives but is not unnecessarily and wastefully heated during the day while the user is at his office.

It will be apparent to those skilled in the art that the transmission from the transmitter 5 consists of a packet of numerical data containing both ID numbers which identify the relevant control apparatus 4, and command instructions to be executed at that location. This packet of data is preferably checked for accuracy by the decoder 12 before the microprocessor 13 is activated.

The preferred form of ID is a 32 bit number which therefore allows over 4 billion combinations. By providing ID bits in common for each

control apparatus 4 located within a specified area, it is possible to affect load shedding by simultaneously switching off loads at every location within the area.

Preferably the system is realised utilizing a transmission frequency of 148.637 MHz and a high priority interrupt pin is used to enable the identified control apparatus 4 to respond to messages as quickly as possible. This arises because in its simplest form the control apparatus 4 has no way of buffering input data.

The foregoing describes only one embodiment of the present invention and modifications, obvious to those skilled in the art, can be made thereto without departing from the scope of the present invention.

The claims defining the invention are as follows:

1. A system for remote operation of public utility loads and/or meters, said system comprising a central station, a plurality of widely dispersed user locations each of which is connected through the public telephone network to the central station, a public paging transmitter accessible via the public telephone network, a paging receiving device at each said user location and connected to control apparatus at said location for the reading of a meter and/or the operation of a switch, said control apparatus being connectable to said public telephone system at said location following receipt of a transmitted pager signal.

2. A system as claimed in claim 1 wherein each said control apparatus comprises a microprocessor, and a decoder connected between said microprocessor and said paging receiving device to decode said transmitted pager signal for said microprocessor, said microprocessor being connected to at least one switch means for operation of same.

3. A system as claimed in claim 2 wherein said meter is connected to said microprocessor via an encoder, the encoded output of said meter constituting an input for said microprocessor.

4. A system as claimed in claim 3 wherein a telephone dialler and modem are connected between said public telephone system and said controller, said telephone dialer being operable by said microprocessor to connect same to said central station, and said modem being thereafter operable to transmit the encoded output of said meter to said central station.

5 A system as claimed in claim 4 wherein said modem is arranged to receive switch operating instructions for said microprocessor from said central station at the conclusion of the transmission of said encoded meter output.

6. A system as claimed in any one of the preceeding claims wherein said public paging transmitter is accessible by either said central station, or subscribers to said public utility, or both.

7. A system as claimed in any one of the preceeding claims wherein all the page receiving devices within a predetermined locality are addressable with an address having the same prefix digit(s) whereby like loads in said locality can by substantially simultaneously switched by transmission of a common pager signal thereto.

8. A system as claimed in any one of the preceeding claims wherein said meter is selected from the consisting of an electricity meter, a gas meter and a water meter.

9. A system for remote on of public utility loads and/or meters, said system being subs...ily as herein described with reference to the accompanying drawings.

10. Control apparatus for a system as claimed in any one of claims 1 to 9 and comprising a microprocessor, a decoder connecting said microprocessor to a paging receiving device, a telephone dialler and modem connecting said microprocessor to said public telephone system, at least one switch means connected to, and operable by, said microprocessor, and an encoder connecting said meter and said microprocessor.

11. Control apparatus for a system as claimed in any one of claim 1 to 9, said apparatus being substar...lly as described herein with reference to Fig. 2 of the accompanying dra

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Patent Attorneys for the Applicant
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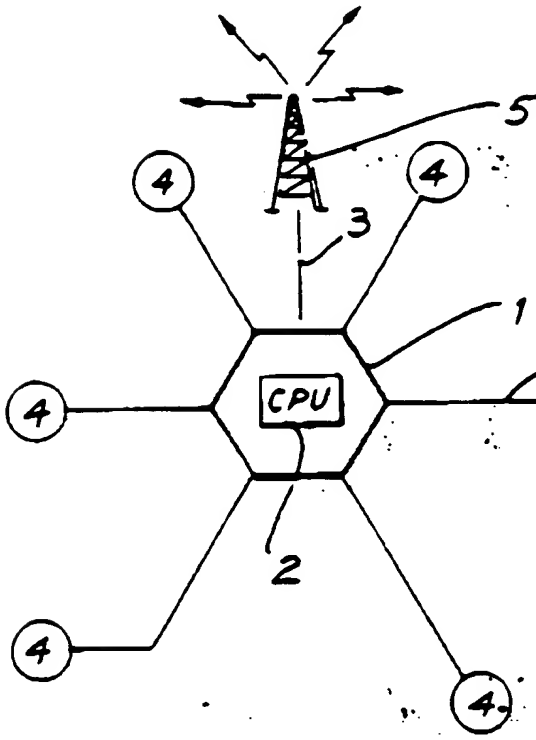

FIG. 1

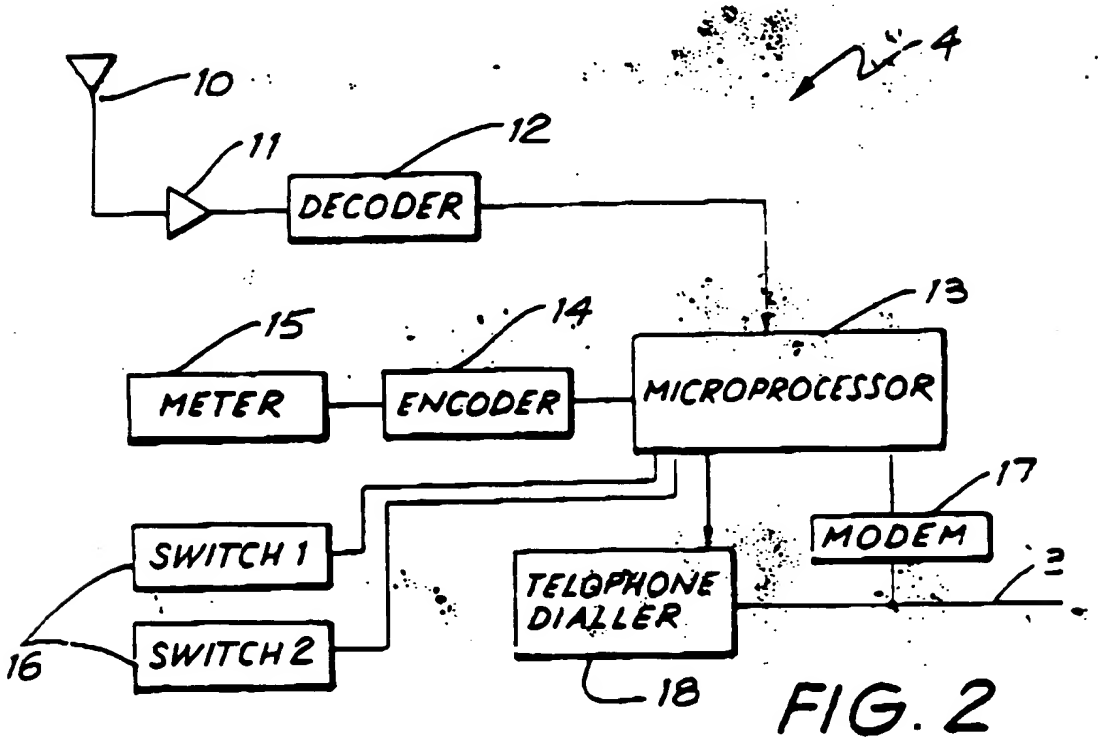

FIG. 2